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D E C I S I O N
of 10 January 1995

Case Number: T 0937/90 - 3.2.2

Application Number: 81902168.4

Publication Number: 0065950

IPC: C23C22/13

Language of the proceedings: EN

Title of invention:
PHOSPHATE COATING PROCESS AND COMPOSITION

Patentee:
CHEMFIL CORPORATION

Opponent:
Henkel Kommanditgesellschaft auf Aktien
Metallgesellschaft AG, Frankfurt/M
Henkel Corporation

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 83, 123(2)

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
-



Case Number: T 0937/90 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 10 January 1995

Appellant: CHEMFIL CORPORATION
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 17 September 1990
revoking European patent No. 0065950 pursuant to
Article 102(1) EPC.

Composition of the Board:

Chairman: H. Seidenschwarz
Members: R. Lunzer
M. Auz Castro

Summary of Facts and Submissions

I. European patent No. 65 950 was granted on 25 November 1987 on the basis of application No. 81 902 168.4, filed on 24 July 1981, claiming a priority date of 8 December 1980 derived from US Application No. 214 537.

Independent Claims 1, 4 and 5 were in the following form:

"1. A method of phosphate coating a ferrous metal surface prior to painting, including cathodic electropainting, comprising contacting the metal surface to be treated with an aqueous solution of an alkali metal phosphate and zinc dihydrogen phosphate in which:

the zinc concentration is 0.1 to 1 gram per liter,

the mole ratio of said alkali metal phosphate to zinc dihydrogen phosphate is from .5 to 2:1 and

the weight ratio zinc to phosphate in the solution is higher than 1:12; and

producing a phosphate coating on said metal surface enriched in zinc-iron phosphate phosphophyllite compared to zinc phosphate hopeite and wherein said phosphate coating has a predominant horizontally oriented fine crystalline structure resistant to physical abuse and corrosion."

"4. An aqueous solution of an alkali metal phosphate and zinc dihydrogen phosphate, wherein the zinc concentration is from 0.1 to 1 gram per liter, the mole ratio of said alkali metal phosphate to zinc dihydrogen phosphate is from 0.5 to 2.1, the weight ratio zinc ion to phosphate ion is higher than 1:12 and the solution is suitable to produce a phosphate coating on ferrous metal surfaces treated with said solution, by spraying or immersion, enriched in zinc-iron phosphate

phosphophyllite compared to zinc phosphate hopeite and having a predominant horizontally oriented fine crystalline structure resistant to physical abuse and corrosion."

"5. The use of an aqueous liquid concentrate including: the following ingredients in weight percent:

Zinc oxide	5% to 5.2%
Phosphoric acid	28% to 28.1%
Sodium hydroxide	4.5% to 4.6%
Nitric acid	5.20% to 5.25%
Water	54.9% to 57.15%

for preparing a phosphate coating aqueous solution comprising a sodium phosphate and zinc dihydrogen phosphate, wherein the mole ratio of said sodium phosphate to said zinc dihydrogen phosphate is 0.5 to 2:1 and the zinc concentration is from 0.1 to 1 g/liter, and the zinc to phosphate mole ratio is from 1:4.48 to 1:4.65."

II. Three oppositions were filed within the prescribed time limit by the Respondents. The grounds of opposition included Articles 100(a), (b) and (c) EPC. The Opponents relied in particular on the following prior art documents:

- (2) DE-B-2 232 067 (DE equivalent of (2b))
- (2b) JP-B-50 6 418
- (2c) English translation of (2b)
- (6) Proceedings of the Tenth World Congress on Metal Finishing, Kyoto, Japan, 12-17 October 1980, pages 33-307
- (9) EP-A-0 015 021.

III. By its decision, given in writing on 17 September 1990, the Opposition Division revoked the patent. It found that the amendments made during prosecution of the application did not introduce subject-matter which extended beyond the content of the application as filed, and therefore there was no valid objection under Article 123(2) EPC. However, it interpreted a written statement filed by the Appellant during the opposition as meaning that the molar ratio of alkali metal phosphate to zinc dihydrogen phosphate (hereinafter AMP:ZHP) could not be based on a calculation assuming all the zinc ions to be present as ZHP, and all the alkali metal and remaining hydrogen phosphate ions as AMP. Hence it found that Claims 1 to 4 were unclear in the sense that the skilled worker would not be able to establish whether a given bath fell within the scope of the claims or not. Although lack of clarity of claims was not a ground of opposition, in construing Claim 1 the Opposition Division disregarded the express limitation of the AMP:ZHP ratio, with the consequence that it held that Claims 1 and 4 lacked novelty over the combination of documents (2b) and (6), the combination being possible in view of the reference in (6) to (2b), and Claim 5 lacked inventiveness over the combined teachings of the same documents. The patent was therefore revoked.

IV. An appeal against that decision was filed on 19 November 1990, the appeal fee was paid on 16 November 1990, and the Statement of Grounds of appeal was filed on 25 January 1991. In that Statement, and during oral proceedings held on 10 January 1995, the Appellant argued that the molar ratio AMP:ZHP could be accurately determined, such as by making up a bath composition by adding the components in the requisite proportions by

weight, or the composition of an existing bath could be calculated by ascertaining through conventional analysis the total amounts of Zn:PO₄ and alkali metal ions present.

Novelty could not be challenged if the essential feature of the molar ratio of AMP:ZHP were to be taken into account. As for inventiveness, since both documents (2b) and (6) taught that it was desirable to have less Zn present in the bath than would result in Zn:PO₄ ratio of above 1:12, it could not have been obvious at the priority date to use the relatively higher zinc contents of the alleged invention, in accordance with which the Zn:PO₄ ratio had to be at least 1:12.

Regarding the inclusion in the application of features which as was alleged had not been disclosed in the application as filed, contrary to Article 123(2) EPC, the disclaimer introduced into Claim 1 of the weight ratio Zn:PO₄ higher than 1:12 was admissible in the circumstances of the present case. Although the application as filed contained extensive references to the prior art, further citations brought to light during the search showed that there was a known area of phosphating bath compositions having less Zn than would give a ratio of 1:12.

With a letter dated 8 December 1994 the Appellant filed an auxiliary request in accordance with which it sought a patent based on a single claim, the wording of which followed exactly Claim 5 of its main request, as set out above.

V. The Respondents contended in their written and oral statements that there was insufficient disclosure of the alleged invention, contrary to Article 83 EPC, due to the fact that no method was disclosed of how the molar ratio of AMP:ZHP in the range of 0.5 to 2:1 was to be determined. The degree of ionisation of these compounds was dependent on the pH of the solution, and could be further influenced by the presence of the additives to the bath of the kind mentioned at page 3 lines 60 to 61 of the description of the patent in suit, where reference was made to the optional presence of nickel salts, fluoride salts, sodium meta-nitrobenzene sulphonate, various surfactants, and sodium chlorate. These substances when present in solution could influence the degree of ionisation.

The objection that the claimed subject-matter went beyond the disclosure of the application as filed was based on the introduction into Claim 1 during examination of the weight ratio of Zn:PO₄ in excess of 1:12. That feature was not disclosed in the application as filed, and had been introduced by way of alleged disclaimer of prior art cited during examination. While admitting that the claims of document (2), as well as of the other documents belonging to the same family were indeed restricted to a Zn:PO₄ ratio below 1:12, the Respondents argued that the disclosure of a prior published document could not be regarded as limited to what was claimed, particularly where, as here, the comparative examples in Table 1 of documents (2), (2a) and (2c) had Zn:PO₄ ratios above the 1:12 limit which was preferred, i.e. actually falling within the present claims despite the presence of the disclaimer. Consequently, the disclaimer was not effective to establish novelty over the prior art insofar as the feature of the weight ratio Zn:PO₄ was concerned.

Novelty and inventiveness were both challenged on the basis of the disclosure of document (2c) (Table 1, page 12, line 3 of the translation) which was equivalent to document (2) (Table 1, columns 3 and 4, line 3). Document (2) contained in columns 3 lines 16 to 19 some further information going beyond the content of document (2c). This made it possible to demonstrate by calculation that the AMP:ZHP ratio of the bath used for the tests reported in Table 1 was 0.33:1, i.e. only marginally below the lower limit of Claim 1 in suit, at 0.5:1. Document (6), which referred to document (2b), demonstrated the desirability of phosphophyllite in preference to hopeite when the objective was improved corrosion resistance.

The description was confusing for the skilled reader in that it included under the heading, "Best mode of carrying out the invention", a bath composition which could not fall within the scope of Claim 1, while there were four pages of tests reported, all carried out with phosphating baths of wholly unidentified compositions.

VI. The Appellant (patentee) requested that the decision under appeal be set aside, and that the patent be maintained as granted, and by way of auxiliary request, that the patent be maintained on the basis of the single claim filed on 8 December 1994, the description as filed during the oral proceedings, and Figures 1 to 5 as granted.

The Respondents (opponents) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. *Article 123(2) EPC - allowability of disclaimers*
 - 2.1 In the course of Examination the Appellant's attention was drawn to five documents ((2), (2a), (2b) with its translation (2c), (6) and (9)) each of which taught the need for a weight ratio of Zn:PO₄ below 1:12-100 in phosphating baths. In contrast, the alleged invention is concerned with baths having a defined AMP:ZHP ratio, and a Zn:PO₄ ratio which is above the 1:12-100 range known from that cited prior art. In the application as filed, that prior art had not been taken into account. However, as the disclosure of the patent in suit was non-specific in this regard, and could have covered Zn:PO₄ ratios both above and below the 1:12 limit, the Examining Division permitted the introduction of a disclaiming limitation based on the cited prior art. The Board sees no need in the circumstances of the present case to rule on whether the disclaimer should have been permitted, save to observe that, so far as concerns the feature of the ratio Zn:PO₄, it cannot be regarded as fully effective to exclude the prior art which discloses comparative examples falling within the claims of the patent in suit notwithstanding the disclaimer. Therefore, the limit upon the ratio of Zn:PO₄ is treated as an essential integer of the claims.

3. *Article 83 EPC - sufficiency of disclosure*

3.1 The sufficiency of the disclosure of the description was challenged on the ground that no method had been disclosed for the determination of the ratio of AMP:ZHP. That analysis could be complicated because there might be only partial ionisation in solution at any given time. It is true that the description says nothing about problems of analysis, but the skilled reader knows that he can make up a bath by mixing ingredients in fixed proportions according to weight, or that simple chemical analysis of an existing bath will tell him the proportions of the ions, irrespective of whether under some conditions there might be incomplete ionic dissociation.

3.2 In these circumstances, the skilled reader would adopt the simple interpretation of the specification, as being concerned with the amounts of the respective ions in the bath, irrespective of their degree of ionisation. Although, as is amplified below, a great deal is unclear in the description, in the Board's view the skilled reader would face no difficulty either in formulating a bath in accordance with the claims, or in determining whether an existing bath fell within the claims. Accordingly, the objection under Article 83 EPC does not succeed.

4. *Description of the alleged invention*

4.1 As expressed in Claim 1, the alleged invention involves using a phosphating bath having the defined composition with respect to:

- (a) zinc concentration (0.1 to 1 gram per liter)
- (b) molar ratio of alkali metal phosphate to zinc dihydrogen phosphate, (AMP:ZHP from 0.5 to 2:1) and
- (c) weight ratio zinc to phosphate (Zn:PO₄, higher than 1:12)

so as to produce a phosphate coating on a ferrous metal surface, which coating is rich in phosphophyllite compared to hopeite, and has a predominant horizontally oriented fine crystal structure which is resistant to physical abuse and corrosion.

4.2 Illustrative compositions which are said to have been used successfully are those given the numbers 168, 169, 170, and 171 at page 9 lines 30 to 50 of the description. These compositions were the basis for the narrow ranges of Claim 5 of the main request (the sole claim of the auxiliary request).

4.3 The Board sees no reason to doubt that these compositions may be useful for their intended purpose. However, as soon as it turns to the issue of how the performance of these compositions compares with compositions in accordance with the prior art, there is no guidance apart from the confusion reflected by the description of the patent in suit.

4.4 At page 3 line 31 there is a heading "Best method of carrying out the invention", under which it might be expected that the alleged invention would be described. In fact the bath composition described at lines 48 to 58 does not fall within the claims, and must be intended to relate to conventional baths of the prior art. Further confusion arises from the passage from lines 34 to 42 of page 3, which stresses that in accordance with the alleged invention increased amounts of alkali metal salts are to be used. However, when the alleged

invention is compared with the prior art, it is observed that the claimed compositions contain significantly **less** AMP than the approximately 20:1 of the detailed examples of documents (2), and (2c).

4.5 Still further confusion results from the tests reported at pages 5, 6, 7, and 8 of the description. The compositions of the phosphating baths used for those tests are not identified, while the tests are reported as having been performed, not only on ferrous surfaces as might have been expected, but also on galvanised steel and aluminium substrates. The reader is left wondering what these tests are intended to show, and what relevance they are supposed to have to the alleged invention.

4.6 The description is illustrated by Figures 1 to 4 which are photomicrographs, of which 1 and 3 are said to illustrate coatings made in accordance with the prior art, while Figures 2 and 4 are said to be coatings according to the invention. The coatings according to the alleged invention are seen to be much finer than those said to be in accordance with the prior art, but the composition of the prior art bath used for the purposes of making this comparison is not identified. Even the later submission by the Appellant in its letter of 7 November 1984, which enclosed some more comparative photographs, went no further than informing the Examining Division that the comparisons had been made by the Appellant using its own prior art compositions.

4.7 The Board would have been willing to attach significance to the identification of some advantage over the closest prior art, whether it were to be filed at the application stage, or at some later stage in the opposition or an appeal. However, in the present case, while the Board readily accepts the assertion by the

Appellant that the use of a bath falling within the claims in suit can result in a good corrosion resistant coating having the desired predominance of phosphophyllite, it has no material suggesting that the baths according to the alleged invention produce any better coatings than those of the prior art. The absence of such information, and the general confusion created by the description, have a profound effect on the outcome of the present appeal.

5. *Prior art*

5.1 The document identified as reference (1) in document (6) is the Japanese specification, document (2b). In the circumstances of the present case, the Board agrees with the Respondents that these two disclosures may be read together, particularly because document (6) purports to be no more than a further investigation into the work reported in document (2b).

5.2 The Japanese language document (2b) was discussed in terms of its English translation (2c). It relates to phosphating solutions which are very similar to those of the patent in suit, save that it teaches by way of its Examples 1 to 4 and its claims the need to use a $Zn:PO_4$ ratio of 1:12-100. Documents (2), and (2c) both include a Table identified as Table 1, but whereas in (2c) there are 7 tests described with different $Zn:PO_4$ proportions, the data of which correspond in the two specifications, in document (2) (see column 3 lines 16 and 17) there is an indication of the actual composition of the bath used for the purposes of these tests, as well as an 8th test with a zinc free composition. In contrast, in documents (2c) and (6) the bath composition is lacking.

5.3 These Tables are intended to show the effect of varying the ratio of $Zn:PO_4$ from 1:3.6 to 1:100. Better results are shown for the compositions falling within the scope of the claims of document (2), i.e. with a ratio of 1:12-100, than those which have Zn contents in excess of the 1:12 maximum limit.

5.4 However, the Board attaches particular significance to the third line in each of these two Tables, which has a $Zn:PO_4$ ratio of 1:10, because it shows that the quality of the coatings obtained differs only slightly from the quality of coatings made using baths having a $Zn:PO_4$ ratio within the range of 1:12-100, which is claimed as being the invention of this prior art. The particle size is described as "small", as contrasted with "fine". Also significance is attached to the final column of these Tables, which reports the result of a bending test intended to establish the degree of adhesion of the coatings. In those tests, exactly the same grading is given to these comparative coatings as is given to the coatings having a composition falling within the claims of this prior art. In other words, these two Tables teach the skilled reader that coatings which are comparable to, by slightly worse than, those in the range claimed by this prior art are attainable by working just outside its claimed range, and within the range of $Zn:PO_4$ ratios now claimed by the patent in suit.

5.5 Document (6) has a comparable Table 3 on page 307. Although at page 303 (paragraph headed "Phosphatizing Bath") it states that, "In accordance with the published patent (1) the following four baths with different $Zn:PO_4$ ratios were selected", it is evident from the figures given that the ratios used in the four tests did not coincide exactly with any of those used in the 7 tests of the earlier patent. Of these tests, the most

relevant is B, as to which the weight ratio (calculated from the given molar ratio) is 1:12, i.e. it is on the borderline between the alleged invention and the prior art. Again the teaching is in the direction of using a lower Zn:PO₄ ratio, and in this case it is pointed out in relation to Figs. 1, 2, 4, and Table 3 that a desired improved corrosion resistance is to be attained by ensuring that the proportion of phosphophyllite/phosphophyllite + hopeite is as high as possible.

- 5.6 As is true of document (2c), the composition of the bath, so far as concerns the ratio of AMP:ZHP is lacking.

6. *Novelty*

Although novelty was still contested on appeal, the Board rejects that contention. The closest prior art, document (2c), discloses in the third line of the Table at page 12 a Zn:PO₄ ratio of 1:10. In addition, it discloses at page 8 line 7 that the Zn concentration is in the range of 0.091 to 0.833 g/l. Thus the features (a) and (c) of Claims 1 and 4 are disclosed (see point 4.1 above) but feature (b), the AMP:ZHP ratio, is lacking, as indicated above. None of the other cited documents discloses the zinc concentration within the claimed range (feature (a)) nor is there any disclosure of the feature (c) within the claimed range.

Therefore the subject matter of Claims 1 and 4 is novel, while the novelty of the limited compositions specified in Claim 5 was not attacked. The Opposition Division reached the opposite conclusion so far as concerned the novelty of Claims 1 and 4, but it did so because feature (b) was ignored on the ground that the molar ratio could

not be determined (cf. paragraph III above). As indicated in paragraph 3.2 above, the Board does not accept the reasoning of the Opposition Division with regard to the alleged difficulty of analysis, and has therefore treated feature (b) as an effective limitation on the scope of the claims.

7. *Inventiveness*

7.1 The problem with which the patent in suit is concerned is the attainment of a fine grained coating having a high proportion of phosphophyllite to hopeite. Documents (2c) and (6) both teach that the best results are attainable by having a Zn:PO₄ below 1:12, but at the same time they show that acceptable results are attained on or near to the borderline area. So far as Claims 1 and 4 of the patent in suit are concerned, the description of the alleged invention is so inadequate that the Board is left with the impression that what has been claimed here is not a new range of phosphating bath compositions having properties better than or equal to those of the prior art, but instead the somewhat inferior range mentioned but rejected by this prior art.

7.2 So far as the disclosure of document (2c) is concerned, the alleged invention differs only in that it includes the feature (b) mentioned above, the AMP:ZHP ratio of 0.5 to 2:1. In this situation the Board would regard it as obvious to the skilled worker, noting the absence of the bath compositions for the tests reported in documents (2c) and (6), to seek out the German equivalent of the Japanese patent, i.e. document (2), to see whether it included the missing information regarding the bath compositions used. Document (2) discloses a ratio of AMP:ZHP at the level of 0.33:1, coupled with other examples in which there are much

higher proportions of AMP, of the order of 20:1. That apparent indifference to the proportions of AMP:ZHP was reflected, as argued by the third Respondent, by a number of other cited prior art documents which confirmed that ratios of the order here claimed were known in phosphatising baths of the kind here in question. Thus, in the Board's view, given the disclosure of document (2), in carrying out its teaching the skilled reader would feel no inhibition against using ratios between the disclosed levels of 0.33:1 and 20:1, and that the claimed range of 0.5 to 2:1 covers ratios which he would be likely to adopt.

7.3 Accordingly, the Board finds that the subject-matter of Claims 1 and 4 lacks any inventive step.

8. *Claim 5 and the auxiliary request*

This Claim is based on the four examples identified as 168 to 171 on page 9. The compositional ranges are very narrow, almost to the point of being a claim to a single composition. The subject-matter of this claim is also lacking in inventiveness, because there is no basis for supposing that there is any improvement over, or any useful alternative to, the compositions disclosed in documents (2c) and (6). The Appellant's assertion that there is some improvement over some of its own commercial compositions does not deal with the essential issue of inventiveness over what has been cited as the closest prior art. Accordingly, the Board is not satisfied that even this narrow range involves any inventive contribution to the art.

9. *Conclusion*

As it has been found that the alleged invention, whether in accordance with the main or the auxiliary request lacks any inventive step, the appeal must be dismissed.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



H. Seidenschwarz

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